

APPENDIX B

COORDINATION ACT REPORT



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
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Cheyenne, Wyoming 8200 1

ES-6141 1
pd/W.06/snakecar.pd

October 27, 1998

Mr. Carl J. Christianson
Chief, Environmental Planning Branch
Department of the Army
Walla Walla District, Corps of Engineers
201 North Third Avenue
Walla Walla, Washington 99362-1876

Dear Mr. Christianson:

We have reviewed the Corps' comments on the final Coordination Act Report for the Snake River Environmental Restoration Project: and modified the report based on those comments. Enclosed is the revised final Fish and Wildlife Coordination Act Report for the proposed project. The report was completed pursuant to the scope of work dated April 17, 1998, and prepared under the authority, and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S. C. 661 et seq.).

We look forward to continuing our work with the U.S. Army Corps of Engineers on this project. If you have any questions on this report please contact Pat Deibert of my staff at (307) 772-2374, ext. 26.

Sincerely,

Michael M. Long
Field Supervisor
Wyoming Field Office

COORDINATION ACT REPORT

Snake River Restoration Project

The U.S. Fish and Wildlife Service has reviewed the proposed Snake River Environmental Restoration Project, a proposal to provide ecosystem restoration to four areas on the Snake River between Moose and the South Park Feed Grounds near Jackson Hole, Wyoming. This report has been prepared under the authority, and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S. C. 661 et seq.).

Project Description:

The Snake River in the Jackson area is confined by levees constructed and maintained by the Snake River Flood Control Project (U.S. Fish and Wildlife Service 1990). Concentration of the river flows by the levees has caused extensive erosion: resulting in loss of aquatic and terrestrial wildlife habitat. Fish and wildlife impacts resulting from construction, operation and maintenance of the Flood Control Project have significantly changed the character of the Snake River ecosystem (U.S. Fish and Wildlife Service 1990). The goal of this restoration project is to provide environmental and wildlife habitat restoration of riverine, wetland and riparian habitats within four selected study areas. To accomplish this goal, stability of the channel will be increased and frequency of island removal/destruction will be decreased to allow maturation of vegetation on forested islands and re-vegetation of denuded islands. This project is proposed by the U.S. Army Corps of Engineers, with cooperation of the Teton County Natural Resource District.

Four areas have been selected for restoration. Area 1 is located in sections 13, 14, 23 and 24 of Township 40N, Range 117W; Area 4 is located in sections 2, 3, 10 and 11, Township 40N, Range 117W; Area 9 is located in sections 13 and 34, Township 41N, Range 117 W; and Area 10 is located in sections 5,6 and 7, Township 41N, Range 117W (Figure 1). All sites are in Teton County, Wyoming.

Area Description:

The vegetation in the four project areas is characterized by shrub willow (*Salix* spp.)/cottonwood (*Populus* spp.) riparian communities supported by the natural hydrology of the river system. Other species common within the floodplain and on islands include Englemann spruce (*Picea engelmannii*) and blue spruce (*Picea pungens*), silverberry (*Eleagnus commutata*), alder (*Alnus incana*), Wood's rose (*Rosa woodsii*), buffalo berry (*Sherpherdia canadensis*) and honeysuckle (*Lonicera involucrata*) (U.S. Army Corps of Engineers 1994). Installation of levees has reduced the quantity of the riparian habitat within the levees from 2,761 acres in 1956 to 1,176 acres in 1986. The quality of the remaining riparian habitat has also declined (U.S. Fish and Wildlife

Service 1998). The area of cottonwood forest behind the levees has remained approximately constant between 1956 and 1986, but the quality of this habitat has been reduced. The percent of mature cottonwoods has increased behind the levees, indicating that cottonwood regeneration has declined. There has also been a 149 percent increase of cottonwood-spruce habitat from 1956 to 1986 behind the levee indicating a loss of riparian habitat. The loss has been compounded by the side channels and spring creek habitats being cut-off from the river by the levees (U.S. Fish and Wildlife Service 1998).

Area 1 is the only area not bounded by levees along both banks. Within the past few years the west bank has undergone extensive, lateral erosion due to the "firehose" effect of concentrated river flows emerging from the confined channel upstream. Greater than 300 acres of pastureland have been lost from this erosion.. Vegetation in this area is a combination of shrub willows/cottonwoods on the shore line with some cottonwoods on an existing island. However, these cottonwoods are in danger of removal from high river flows. Surrounding land use is ranching and rural residential.

The vegetation around Area 4 is predominantly shrub willow. Most of the existing islands currently within the channel are void of vegetation due to island instability and changing river flows. This area is bordered by a developing subdivision on the west side. The Jackson Land Trust has obtained an easement on many of the lots within this subdivision for the protection of trumpeter swan wintering and feeding habitats (D. Stevenson, WGFD, pers.comm.). The surrounding land use is rural residential.

Area 9 is bounded by Highway 22 to the south and contains a boat ramp on the west bank used extensively by recreational boaters and outfitters. Vegetation in this area is predominantly shrub/willow, with some mature cottonwoods on an existing island. Surrounding land use is light business, transportation and rural residential. A portion of this area has been selected as a demonstration area to test the proposed restoration techniques. Restoration efforts, to be implemented by Teton County Natural Resource District, are scheduled to begin in the Fall of 1998.

Area 10 is located at the confluence of the Gros Ventre and Snake Rivers. This area has extensive cottonwood vegetation on existing islands and along the shoreline. However, some of the island vegetation was removed by high spring flows in 1998. Surrounding land use is rural residential.

Restoration Techniques:

Several methods are proposed to accomplish the proposed restoration including gravel removal, anchored root wads, brush fences, spur dikes and rock grade control. Table 1 outlines the techniques proposed for use by area. According to personal communications with Teton County Natural Resources District and U.S. Army Corps of Engineers personnel? all construction is

proposed to occur during low water flows in September through early November. Annual maintenance of restoration features may be necessary to maintain their protection/enhancement capabilities.

TABLE 1: Restoration treatments proposed by project area.

T R E A T M E N T S							
<i>Gravel Removal</i>			<i>Fences</i>	<i>Dikes</i>	<i>Root Wads</i>	<i>Rock</i>	<i>Grade</i>
	Channel Capacity	Side Pools	Sediment Traps				
<i>Area 1</i>		X	X	X		x	
<i>Area 4</i>	X	X	X	X	X	X	
<i>Area 9</i>	X	X		X	X	x	x
<i>Area 10</i>	X	X	x	x	X	x	

Gravel Removal

Confinement of the Snake River within levees has resulted in areas of unusually high gravel deposition and reduced channel capacity. Removal of excess gravel from these areas will improve fish habitat (by creating resting areas in side pools), maintain channel capacity, increase channel stability and improve sediment transport. Removal would be accomplished with excavators, loaders, dump trucks and grizzlies. The Wyoming Department of Environmental Quality has not yet made the determination on whether *or* not construction equipment can be operated in flowing water. If construction equipment is not permitted to operate in flowing water temporary diversion dikes will be necessary. Material for these dikes would be from existing riverbed material (U.S. Army Corps of Engineers 1998). Gravel removal in should not occur in side channels to prevent fish entrapment during low water levels.

Brush Fences

Brush fences will be used to help re-establish island riparian habitat and to protect existing island habitat by slowing water velocities and reducing the energy of water flows. Rock grade control structures would be used in conjunction with brush fences in Area 9 to prevent channel down-cutting. Brush fences may be constructed using piling with lateral cables, or with riprap (rock brush fences). Piling brush fences would be constructed by excavating along the fence alignment and driving piles into the river bottom with vibratory hammer mounted on a backhoe. Rock

brush fences will be constructed by excavating a trench to a depth of 4 feet. The trench site would be filled with riprap material of sufficient size to resist removal from high flows. Small materials from the excavation would be hauled off-site (U.S. Army Corps of Engineers 1998).

Spur Dikes

Spur dikes will be used for fisheries habitat enhancement and bank protection. These dikes will create flow diversity and enhance pools, fish resting areas, riffles and seams (U.S. Army Corps of Engineers 1998). Two kinds of spur dikes may be used; kicker dikes and bank barbs. Kicker dikes will be composed of riprap armor with a random fill core and will extend 56 feet into the river. Bank barbs will consist only of riprap and extend 26 feet into the river. Riprap material will be hauled to the dike location with dump trucks (U.S. Army Corps of Engineers 1998).

Anchored Root Wads

Root wad logs would be anchored into the river bottom to protect existing islands and to encourage growth of new islands. On-site root wad logs will be the primary source of this material. If a secondary source is required, this source will be designated by a Corps representative. Installation of the root wads may require leveling of the area by a backhoe. Logs will be fastened with toggle bolt anchors driven in to the ground with a jackhammer (U.S. Army Corps of Engineers 1998). Root wads will not be placed in the lower reaches of Blue Crane or Spring Creek to ensure these areas remain accessible as spawning tributaries.

Rock Grade Control

A rock grade control structure will be used to keep the river from eroding through existing riparian habitat. The rock grade control structure will consist of riprap and will be flush with the existing channel bottom. The footprint of the structure would be excavated and material hauled off-site. Riprap would be placed in the excavation area by carefully keying riprap together (U.S. Army Corps of Engineers 1998).

Access

Access to the western side of Area 1 would be via the existing Fall Creek Road and associated dirt roads. Access would also be provided on levee roads. However, the exact location for river access by heavy equipment, etc. has not been determined at this time. Access to the east side of Area 1 would be along existing roads to levees until the levee terminates. After the levee ends, access would continue through existing shrubs and trees over gravel bars. The exact route taken will be determined by the Corps and will be selected to minimize disturbance to the riparian community.

Access to the western side of Area 4 would be from the existing Fall Creek Road and an associated gravel road. At the road termination, the operator will need to navigate across gravel bars along the channel bottom. Access to the eastern side of this area will be from the Federal Levee Extension. This proposed access is still under negotiation with the adjacent landowner and may change.

Western access to Area 9 would be via State Highway 390 to an existing dirt road and along the right Bank Federal Levee. Eastern access to this area will be from State Highway 22 to the Left Bank Federal Levee. From this levee, the contractor will select access points for specific work areas.

Access to the western side of Area 10 would be via the Right Bank Federal Levee. From the levee, construction equipment will traverse across existing gravel bars and through brush to specific work areas. Eastern access to this area will be via State Highway 22 to the Left Bank Federal Levee or from Cattleman's bridge to the Hanson Levee. The spur dikes located to the north will be accessed from Spring Gulch Road.

Alternatives

Five alternatives are proposed - no action, and four structural alternatives designed to withstand differing intensities of flood events. The structural alternatives include designs to withstand a 1 j-year flood event, a 25-year flood event and two designs to handle a 50-year flood. Potential impacts of these alternatives are discussed in the following Project Impacts sections. The final preferred alternative will be selected based on incremental benefit analysis.

Fish and Wildlife Resources - Existing Condition

Aquatic Resources

Within the four project areas, the Snake River is designated as a Class 1 trout fishery as designated by the Wyoming Game and Fish Department. This designation signifies the River is of national importance as a trout fishery. This fishery is composed primarily of Snake River cutthroat trout (*Oncorhynchus clarki* ssp.). Other game fish present include mountain whitefish (*Prosopium williamsoni*), brown (*Salmo trutta*), brook (*Salvelinus fontinalis*), rainbow (*Oncorhynchus mykiss*) and lake trout (*Salvelinus namaycush*). Non-game fish include the Bonneville reddsides (*Richardsonius balteatus*), speckled dace (*Rhinichthys osculus*), longnose dace (*Rhinichthys cataractae*), Utah chub (*Gila atraria*), leatherside chub (*Gila copei*), Utah sucker (*Catostomus ardens*), bluehead sucker (*Catostomus discobolus*), mountain sucker (*Catostomus platyrhynchus*), mottled sculpin (*Cottus bairdi*) and Paiute sculpin (*Cottus beldingi*) (U.S. Fish and Wildlife Service 1990).

Spawning habitat for the Snake River cutthroat trout is considered one of the major factors limiting population for this species in the upper Snake River drainage. Spawning is limited to spring-fed tributaries. Little or no spawning habitat exists in the main river because high flows, particularly during spring run-off, produce large sediment bed loads and turbidity during the

spawning period. Habitat losses of spawning habitat have occurred from human activities, including diversions for irrigation and levee construction (U.S. Fish and Wildlife Service 1990). Mountain whitefish are very abundant within the project area and prefer fast, deep water. They

are also commonly found in riffle areas in the summer. The Snake River and its tributaries are major spawning areas for this species (U.S. Fish and Wildlife Service 1990). Spawning occurs in September and can continue through November. Non-game fish in this system provide important forage for game fish and fish-eating raptors in the area.

Terrestrial Resources - Avian

Over 150 different species of birds have been observed along the Snake River corridor. Of those, 119 are documented breeders. Seventy-nine percent of the area's breeding birds are associated with the cottonwood-riparian and wetland habitat types found along the Snake River. Many species also congregate and use the area for feeding and resting during spring-fall migration (U.S. Fish and Wildlife Service 1990).

Of the total number of bird species identified, approximately 75 percent are passerines (Table 2). Nearly 65 percent of those birds are probable or documented breeders in this area indicating the value of the riparian habitat to this group. No threatened or endangered passerines, or passerines classified as State species of special management concern occur in any of the project areas (Wyoming Game and Fish 1996, 1997).

All raptors documented within the area breed there (Table 3). Two species, the osprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*) obtain their primary food (fish) from the Snake River. Ospreys are very common in the Jackson area. The Snake River and tributaries provide large amounts of foraging habitat for this raptor because of abundant fish populations (U.S. Fish and Wildlife Service 1990).

Active bald eagle nests occur in close proximity of all four project areas. This species is currently listed as threatened by the U.S. Fish and Wildlife Service, and as a Native Species Status 2 by the Wyoming Game and Fish Department due to on-going significant habitat loss within the State. The bald eagle nest at Area 1 is approximately 300 to 400 yards inland from the eastern river bank (and proposed restoration work). This pair is inconsistently successful in producing fledglings from this nest (D. Stevenson, WGFD, pers. comm.) At Area 4, the bald eagle nest is approximately 50 yards from the eastern levee (and the proposed restoration work). This nest has been consistently productive. The nest at Area 9 is just north of the project area in section 13 and is in close proximity of a restaurant and other high disturbance areas. This nest has been consistently successful despite the disturbance. The nest at Area 10 is along the Gros Ventre River just upstream from its confluence with the Snake River. This pair often relocates their nest annually, but typically uses locations on the Snake and Gros Ventre Rivers within the

proposed restoration area (D. Stevenson, WGFD, pers. comm.). The bald eagle population in the Greater Yellowstone Ecosystem is considered one of the most important breeding populations in the Rocky Mountains and has been increasing since the 1970's. The Snake River unit of this population contributes significantly to current recovery trends of the bald eagle in this region (U.S. Army Corps of Engineers 1994). Both bald eagles and osprey commonly use snags and large living trees for nesting and roosting. Declines of this habitat component are occurring due to hydrologic changes as a result of levee construction (U.S. Army Corps of Engineers 1994).

Two peregrine falcon (*Falco peregrinus*) aeries occur within 15 miles of the proposed restoration areas. Although the restoration project will have no direct impact on these aeries, the adults from these nests often forage within the project areas, particularly Areas 1 and 4 (D. Stevenson, pers. comm.). This species is currently classified as endangered by the U.S. Fish and Wildlife Service, and as a Native Species Status 3 species by the State of Wyoming due to restricted habitat availability and declining populations (Wyoming Game and Fish Department 1996).

Resident and migratory waterfowl use the Snake River and its tributaries for spring/fall staging, breeding, nesting, brood rearing and wintering habitat (Table 4). Trumpeter swans (*Cygnus buccinator*) winter on the Snake River near all four project areas. Winter is a critical time for this species due to decreased availability of habitat and increased competition with other waterfowl species for food (U.S. Army Corps of Engineers 1994). Fish Creek, which flows along the western side of the Snake River near Areas 1 and 4 provides important feeding and wintering habitat for this species. Swans also use the Gros Ventre River at its confluence with the Snake River (Area 10) for feeding and wintering (D. Stevenson, WGFD, pers. comm.). However, this species does not nest along the Snake River. The trumpeter swan is classified as Native Species Status 2 by the Wyoming Game and Fish Department: indicating special management efforts are warranted due to on-going significant loss of habitat (Wyoming Game and Fish Department 1996). Other common waterfowl species in this area include the Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), American wigeon (*Anas americana*), green-winged (*Anas crecca*) and blue-winged teal (*Anas discors*), common goldeneye (*Bucephala clangula*), Barrow's goldeneye (*Bucephala islandica*) and ring-necked duck (*Aythya collaris*).

Common loons (*Gavia immer*) use the Snake River, including the project areas, as a resting stop during the spring migration. This species is classified as Native Species Status 1 by the State of Wyoming in recognition of declining populations and on-going significant habitat loss (Wyoming Game and Fish Department 1996). American white pelicans (*Pelecanus erythrorhynchos*) also use the Snake River in and near the project areas, particularly Areas 1 and 4, for foraging. These birds typically leave the river by late summer (D. Stevenson, WGFD, pers. comm.).

A great blue heron (*Ardea herodias*) rookery is approximately 400 yards from the east bank of the Snake River at Area 1. This species is common in the Jackson area. Most migrate out of the

area in late fall, but there are a few resident birds (U.S. Army Corps of Engineers 1994). The endangered whooping crane (*Grus americana*) occasionally migrates through the project area enroute to Jackson Lake and Grand Teton National Park to the north. However, this species is not common in the project area. Sandhill cranes (*Grus canadensis*) are widely distributed in the

Jackson area and occur primarily in association with wetlands and agricultural fields. This species migrates out of this area by late September (U.S. Army Corps of Engineers 1994).

Terrestrial Resources - Mammals

Four species of biggame animals are common along the Snake River corridor near the proposed restoration areas. Areas 1 and 4 provide crucial winter-yearlong range for moose (*Alces alces*) in the Sublette herd management unit and Areas 9 and 10 provide crucial winter-yearlong range for moose in the Jackson herd management unit. Crucial range is defined by the Wyoming Game and Fish Department as habitat necessary to ensure the long-term survival of a population of animals at a desired level. In addition to the above designation, Area 9 is within a migration corridor for moose within the Sublette herd unit. Elk (*Cervus elaphus*) from the Fall Creek herd management unit winter along Areas 1 and 4, but this habitat is not considered crucial. Elk from the Jackson herd management unit migrate through Areas 9 and 10 (J. Bohne, WGFD, pers. comm.).

All four areas provide spring/summer/fall habitat for mule deer (*Odocoileus hemionus*). Areas 1 and 4 provide habitat for deer within the Sublette herd management unit while Areas 9 and 10 provide habitat for deer within the Jackson herd management unit. The east side of Area 10 is designated as crucial winter range for mule deer in the Jackson herd management unit (J. Bohne, WGFD, pers. comm.).

The grizzly bear (*Ursus arctos*) is a resident species to the area, primarily north of the Jackson Hole area. This species is listed as threatened by the U.S. Fish and Wildlife Service. Current management by the Wyoming Game and Fish Department is to discourage grizzly bears from living in areas of human habitation. The last sighting of a grizzly bear in the Jackson area was of a sow and 3 cubs of the year in 1994 near Area 4. The bears were attracted to the area by 15 cows killed by lightning. The bears were captured and successfully relocated to an area north of Jackson.

In 1995, gray wolves (*Canis lupus*) were re-introduced into Yellowstone National Park and the Greater Yellowstone ecosystem. Some wolves have dispersed to areas outside the Park. However, no confirmed sightings have been documented around Jackson, or in the project area. Gray wolves are not habitat dependent, but could potentially move through the area in search of food. All wolves within Wyoming are now considered part of a nonessential experimental population. Although such wolves remain listed and protected under the Endangered Species

Act (Act): additional flexibility is provided for their management under the provisions of the final rule and special regulations promulgated for the nonessential experimental population on November 22, 1994 (59 FR 60253). On any unit of National Park System or National Wildlife Refuge System lands, wolves that are part of the experimental population are considered a threatened species and the full provisions of section 7 of the Act apply. Additional management flexibility is provided for managing wolves existing outside units of the National Park or National Wildlife Refuge System. Wolves designated as nonessential experimental in these areas are treated as proposed rather than listed.

Common furbearers in the project area include the mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), river otter (*Lutra canadensis*) and beaver (*Castor canadensis*). Mink are found in relatively lower densities and prefer riverbottom habitats that provide adequate cover and an abundant food source. Selected prey items include fish, amphibians, birds and various small mammals, fruits and berries. The presence of riprap flood protection levees has created an abundance of denning habitat for this species (U.S. Army Corps of Engineers 1994). Muskrats are a semi-resident of ponds, oxbows and spring creeks within the project area. They feed primarily on aquatic vegetation. Muskrats are economically important as a furbearer and are annually harvested within and adjacent to the project area.

The Snake River is identified as one of the most significant areas in Wyoming for the river otter. Otters use log jams, pools and oxbows as foraging areas due to the large number of fish which congregate in these areas. Due to the lack of suitable habitat, otters are not common between levees (U.S. Army Corps of Engineers 1994). Beavers are also present in the project areas. They rely heavily on cottonwood trees for lodge and dam construction and prefer vegetation in the willow shrub understory as a food source. Flood control levees have decreased the availability of denning habitat for this species (U.S. Army Corps of Engineers 1994). Prime habitat is found along spring creeks, side channels and oxbows.

A number of small mammalian species use the project area on a permanent, seasonal or transient basis. Populations of small mammals are cyclic in nature with densities varying by season. However, if sufficient habitat is available, small mammal densities are relatively high. The multi-layered herbaceous vegetation provides a diverse habitat for various mammal species found in the area. The masked shrew (*Sorex cinereus*), dusky shrew (*Sorex monticolus*) and northern water shrew (*Sorex palustris*) are documented in the project area and prefer mesic habitats with a source of water nearby. The project area provides an abundant terrestrial and aquatic insect source for shrews. Vole species include the southern red-backed vole (*Clethrionomys gapperi*), heather vole (*Phenacomys intermedius*), montane vole (*Microtus montanus*), meadow vole (*Microtus pennsylvanicus*), water vole (*Microtus richardsoni*) and long-tailed vole (*Microtus longicaudus*). Area riparian habitats supply voles with an abundance of plant material, seeds, fruits and insects for food as well as leaf litter, logs and windfallen trees for security. Deer mice (*Peromyscus maniculatus*) and western jumping mouse (*Zapus princeps*) are also found in the cottonwood understory. Squirrels found in the project area include the golden mantled ground squirrel

(*Spermophilus lateralis*), yellow-bellied marmot (*Marmota flaviventris*), red squirrel (*Tamiasciurus hudsonicus*), Uinta ground squirrel (*Spermophilus armatus*) and least chipmunk (*Tamias minimus*). Other small mammals common to the area include the northern pocket gopher (*Thomomys talpoides*), bushy-tailed woodrat (*Neotoma cinerea*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*) and porcupine (*Erethizon dorsatum*).

Reptiles and Amphibians

The project areas may provide habitat for the tiger salamander (*Ambystoma tigrinum*), northern leopard frog (*Rana pipiens*), spotted frog (*Rana pretiosa*), boreal chorus frog (*Pseudacris triseriata maculata*), rubber boa (*Charina bottae*), bullsnake (*Pituophis melanoleucus sayi*), wandering garter snake (*Thamnophis elegans vagrans*) and valley garter snake (*Thamnophis sirtalis fitchi*).

Project Impacts - General

Determining the actual project impacts to terrestrial and aquatic wildlife is difficult given the changing morphology of the Snake River. Engineering plans finalized in the summer of 1998 will likely be changed for some project areas due to the continually changing river structure from high water flows. For example, some islands designated for protection were destroyed by spring flows in 1998, and gravel has been re-distributed in other areas, making changes in the location of gravel removal necessary. Below is a summary of projected impacts to terrestrial and aquatic wildlife. Due to river changes, these descriptions have been kept necessarily general and may be changed if significant engineering changes are necessary for project completion.

Projected Impacts - Aquatic Wildlife

There will be significant disturbance to fishes and aquatic invertebrates due to instream construction activities. The impacts may include direct mortalities, movement disruption and/or temporary habitat displacement. No existing aquatic wildlife resources have been identified as currently being threatened due to limited population size. If the work is completed during the fall, spawning migrations of the Snake River cutthroat trout will not be disrupted. However, spawning activities and redds of mountain whitefish may be disrupted within each project area. These impacts are not expected to be significant or long-term (J. Kiefling, WGFD, pers. commun.)

The proposed restoration project was described in the Coordination Act Report drafted for the maintenance of the Snake River levees in 1988 as mitigation for those activities (U.S. Fish and Wildlife Service 1990). If successful, the proposed project will benefit aquatic wildlife, particularly Snake River cutthroat trout, by providing resting areas, channel stability and overhanging vegetation. The proposed project is supported by Wyoming Game and Fish Department. A cutthroat habitat evaluation procedure has been proposed by the Wyoming Game

and Fish Department, with concurrence of the U.S. Army Corps of Engineers, to measure the effectiveness of the implemented restoration measures. This procedure will allow comparison to pre-restoration conditions to assess the effectiveness of the project. In order to adequately assess any impacts or benefits of this project, monitoring will be necessary for a minimum of three years will be. Although this project will assist in restoration of limited areas of fishery habitat, a system-wide solution is still necessary to protect important fish and wildlife resources negatively impacted by continued building of levees along the Snake River. A riparian maintenance plan should be developed by an interdisciplinary team to preserve the diversity and value of this ecosystem.

There should not be significant differences in potential impacts to aquatic wildlife between the four action alternatives. However, displacement and temporary habitat disruption will occur more frequently with the 15-year and 25-year alternatives, versus the 50-year alternatives, due to the increased necessity of repair work on the structures with the shorter expected life spans.

There may be a negative impact to fishing-related recreation within the project areas. Low flows in September and October provide excellent flyfishing opportunities in the Snake River. Many commercial outfitters float through the project areas while providing guided flyfishing tours. The proposed construction activity may disrupt some of these activities. All efforts should be made to inform the outfitters of construction schedules, including daily communications, if necessary. Additionally, river diversions should be designed to allow passage of boats at all times. Given the short duration of construction activities, there should be no long-term impacts to recreational fishing.

Project Impacts - Terrestrial Wildlife

To determine the impacts of project construction on wildlife habitat within the four project areas, the Habitat Evaluation Procedures (HEP) were used to evaluate the quality and quantity of two representative vegetative cover types; palustrine shrub scrub and palustrine forest, including cottonwoods. The palustrine shrub scrub cover type was evaluated using a modification of the yellow warbler (*Dendroica petechia*) HEP model. A modification of the song sparrow (*Melospiza melodia*) HEP model was used to evaluate the palustrine forest habitat. Using HEP, habitat quantity and quality are quantified and multiplied together to produce "habitat units." A comparison of habitat units for baseline and "with project" conditions allows HEP users to quantify project impacts/benefits.

Using estimates of habitat type coverage and quality from 1991 and 1996 uncontrolled aerial photos, field data collected in 1996, and estimates of habitat quantity and quality with restoration efforts: changes in habitat units for these two cover types were projected for 50 years after project implementation. These results are based on the expected habitat changes under both 50-year alternatives. An incremental analysis was subsequently conducted on both the 15- and 25-

year alternatives. Changes in habitat units for a “no action” alternative were also estimated. For the palustrine shrub scrub cover type, the number of habitat units for yellow warblers progressively increased over time after implementation of the proposed project for all four areas. Under the no action alternative, the number of habitat units are projected to decline (Table 5). Similarly, for the palustrine forest the number of song sparrow habitat units also increased progressively over time for all four project areas with the 50-year alternatives after project completion (Table 5). The incremental analysis showed that there would be smaller increases in habitat units under the 15- and 25-year alternatives. The no action alternative resulted in a decrease of habitat units (Table 5). These data also suggest that cottonwood re-generation and retention would be stimulated by implementation of the project.

TABLE 5: Summary of HEP results for each Project Area and Habitat Type. Results are presented for data collected in 1996, projected values 50 years after project implementation (50 Years), and no action (NA).

	Area 1			Area 4			Area 9			Area 10		
Shrub/ Scrub	50 1996	Years	NA	50 1996	Years	NA	50 1996	Years	NA	50 1996	Years	NA
Habitat units	126.6	318.9	76.1	71.7	98.1	43.5	7.6	13.2	4.4	24.9	45.3	15.0
Acres	384.5	398.7	230.7	105.1	122.6	63.1	10.7	16.5	6.4	37.9	56.5	22.7
HSI Values	0.33	0.80	0.33	0.68	0.80	0.69	0.71	0.80	0.69	0.66	0.80	0.66
Forest												
Habitat Units	1.9	10.4	1.1	37.4	53.4	22.5	5.2	8.2	3.1	26.3	47.9	15.0
Acres	2.5	12.0	1.7	44.1	61.4	26.5	6.0	9.4	3.6	31.3	55.1	18.8
HSI Values	0.68	0.87	0.68	0.85	0.87	0.85	0.87	0.87	0.85	0.84	0.87	0.80

The results of the HEP analyses suggest the proposed work will benefit terrestrial wildlife by restoring riparian habitat. Stabilization of existing and re-generation of new riparian vegetation will ultimately result in an increase in density, and possibly diversity, of terrestrial wildlife. There will be short-lived negative impacts from access routes, staging areas for gravel sorting and heavy equipment storage, reduced air and noise quality and increased traffic. Actual impacts from these associated activities cannot be fully assessed at this time since access routes and

staging areas have not been determined for all sites. However, these impacts should be temporary (occurring during the construction period only) and if mitigated, long-term impacts will be minimal, and more than offset by project benefits.

If the fall construction schedule is followed, impacts to nesting birds, such as bald eagles, ospreys and other raptors, great blue herons, waterfowl, shorebirds and passerines will be minimal. Cottonwood regeneration will result in continued nesting and roosting habitat for ospreys, bald eagles and other raptors, as well as great blue herons. These resources would decline without the project. The fall construction schedule will also eliminate impacts to spring migratory birds, including common loons and whooping cranes. Impacts to peregrine falcons should be minimal since young of the year will have fledged and will no longer be completely dependent on adults foraging within project areas 1 and 4. Trumpeter swans typically move into winter feeding areas in late November to early December. Completion of the project by early November will minimize impacts to trumpeter swans wintering in the area. Some displacement of fall migrants, including waterfowl and sandhill cranes, may occur. However, given the limited size of each project area, sufficient staging and feeding habitats outside the disturbance should still be available.

If all work in each project area is completed by early November, impacts to big game species dependent on these areas should be minimal. Elk, mule deer and moose typically begin to use these areas in mid to late November, depending on early season snowfall amounts. There should also be minimal impacts to animals migrating to and from feedgrounds in the area since these migrations often occur in late November and December, and in April and early May (J. Bohne, WGFD, pers. comm.).

The potential for occurrence of grizzly bears and gray wolves in the project areas is minimal and the project should have no impact on these species. However, every precaution should be taken by the construction crews to ensure grizzly bears are not attracted to the work site. There may be indirect impacts (displacement and temporary habitat loss) to furbearers in the area. However, these impacts should be minimal due to the limited size of each project area. Additionally, any impact to this group should be fully mitigated by the improvement in riparian habitat gained through project implementation. There should be no impacts on furbearer trapping activity since seasons for most furbearers begin after construction is proposed for completion.

There will likely be some direct loss of small mammals and their habitat, as well as associated impacts, such as displacement. However, most of the small mammals in the area have a high reproductive capacity, and long-term population impacts are not anticipated. Additionally, habitat for these species should increase after project implementation. Similarly, there will likely be direct and indirect losses to some reptiles and amphibians. However, long-term population impacts are not anticipated.

Recommendations:

1. Use existing access routes and staging areas where possible. If new access routes must be constructed: the routes should be placed to minimize damage to riparian vegetation and wetlands.
2. All new routes and staging areas constructed for the purpose of this project should be fully mitigated by restoring the natural topography and re-establishing native vegetation. Additionally, no public access should be allowed on new access routes to minimize the possibility that these routes become "established" through use after project completion. These non-public access routes should be properly gated to prevent non-authorized vehicular access.
3. As much as possible, material for construction of brush fences, root wads and kicker/spur dikes should be obtained on-site or from a source certified as disease free. If a secondary source of these items is required, this source should be approved by the Wyoming Game and Fish Department, Fisheries Section, to minimize the chance for fish disease transmission.
4. To protect nesting bald eagles, ospreys, great blue herons and other avian species, as well as migrating whooping cranes and common loons, no construction activities should begin prior to August 15. This includes construction of any new access routes and staging areas, movement of equipment to project areas and long-term survey team activity. Should no bald eagles nest within one mile of the project area, work may begin earlier than August 15 *after* consultation with the U.S. Fish and Wildlife Service. This consultation is necessary to ensure no other nesting migratory birds will be impacted by construction activity.
5. To protect wintering big game and trumpeter swans: all construction activity should be concluded by November 15. This includes removal of all associated equipment. Site visits to these areas after November 15 should be limited to only those absolutely necessary for project administration. If work cannot be completed by this date, or if big game have not begun moving into the area due to fair weather conditions, work may continue after November 15. However, this continuation can only occur *after* concurrence is received by the Wyoming Game and Fish Department.
6. All garbage, including food, should be removed from the project areas daily to discourage grizzly bears from entering the area. Bear proof trash and food storage containers should be provided to construction crews.
7. All construction and associated activities should be restricted to the area between levees to minimize potential damage to spring creeks, side channels and oxbows. For Area 1, all work

should be restricted to the river channel and immediately adjacent bank. Access to Area 1 should avoid damage to all spring creeks and the access route may require approval by a biologist to avoid unnecessary damage.

8. All equipment necessary for instream use should be thoroughly examined and serviced to minimize the potential for discharge of petroleum products into the Snake River. All equipment should be serviced off-site to prevent accidental spills of petroleum products into the River.
9. All activities should be performed in a manner that meets State and Federal water quality standards.
10. Borrow areas, if necessary, should be located outside the riparian corridor and avoid important fish and wildlife habitat.
11. Officials in charge of on-site construction should provide construction schedules by Area to local fishing outfitters. All efforts should be made to keep affected outfitters informed of changes in construction schedules.
12. A monitoring program for all restoration areas should be established to determine the effectiveness of this project. Monitoring should continue for a minimum of 10 years.
13. If annual maintenance of the protection/enhancement structures if necessary, this maintenance should be conducted in late summer to minimize potential impacts to nesting bald eagles, raptors and other migratory birds, and to wintering big game and trumpeter swans. If maintenance must be conducted outside the late summer period, the party responsible must work with either the U.S. Fish and Wildlife Service (bald eagles, migratory birds, raptors) or the Wyoming Game and Fish Department (big game) to ensure the proposed activities will not negatively impact these species.
14. Although this project will assist in restoration of limited areas of fish and wildlife habitat, a system-wide solution is still necessary to protect important fish and wildlife resources negatively impacted by levees along the Snake River. A riparian maintenance plan should be developed by an interdisciplinary team to preserve the diversity and value of this ecosystem.

Summary of Findings and Service Position:

Construction of levees along the Snake River near Jackson Hole, Wyoming, and the resultant concentration of water flows has caused extensive erosion, resulting in loss of aquatic and terrestrial wildlife habitat and significantly changing the character of the Snake River ecosystem (U.S. Fish and Wildlife Service 1990). The proposed project, if successful, will provide

environmental and wildlife habitat restoration of riverine, wetland and riparian habitats within four selected study areas on the Snake River.

This project will benefit many species dependent on riparian habitat and facilitate restoration of the Snake River ecosystem within the four study areas. Specific examples include cottonwood regeneration for future bald eagle nesting and roosting sites, resting pools and habitat stability for the Snake River cutthroat trout, and restored habitat diversity for numerous passerines and mammals, including big game species. Impacts from construction and access will be minimal and will be offset by the anticipated benefits.

This project will result in an improvement of the riparian community impacted from extensive levee construction. Although the project is too limited in extent to fully offset past impacts of levee construction and maintenance, it is a very positive step toward restoring fish and wildlife habitat in this river system. The demonstration project proposed by the Teton County Natural Resources District is to determine if the proposed restoration techniques can accomplish large scale restoration efforts, and to stabilize islands, banks and channels in the limited demonstration area. The U.S. Fish and Wildlife Service supports this project.